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The influence of circulation types on drought variability in Croatia

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Droughts are a recurring feature of climate variability in Croatia and are of great importance as they cause high economic losses and severe damage in particular to the agriculture and water management sectors. Understanding the origin and course of drought events, as well as developing forecasting approaches, requires knowledge of the synoptic framework of droughts. In this context, weather and circulation type classifications provide one feasible approach for characterizing main synoptic patterns and for analyzing related impacts on drought dynamics.

Against this background, a new circulation type classification for Croatia has been developed and applied to time series of the Standardized Precipitation Index (SPI) to analyze the spatial and temporal variability of drought events in Croatia.

In our contribution the development of the new classification is documented and the resulting 20 circulation types are characterized with regard to their main synoptic-climatological properties.

Using SPI time series for 31 stations from the official Croatian network for the period from 1981 to 2020, we investigate the relationship between weather patterns and drought events. Based on the estimation of percentage anomalies significant drought relevant circulation types are identified for varying SPI period lengths and drought thresholds also taking into account seasonal and spatial variations. Temporal variations in occurrence frequencies of drought-relevant circulation types are then related to SPI time series and the relevance of the circulation types for the temporal drought variability is statistically quantified.

Preliminary results of our analyses show that:

- identified relevant weather patterns reflect clear synoptic configurations associated with drought.
- Partly distinct differences in drought-related patterns can be observed between seasons and depending on the SPI-period length, while
- respective differences between climatic regions of Croatia are barely pronounced.
- Large parts of the interannual SPI variability at the stations can be attributed to corresponding frequency variations in drought-relevant circulation types.